

REMARKS

Claims 1 – 36 are pending in the application. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

REJECTION UNDER 35 U.S.C. § 103

Claims 1, 2, 8 – 14, 17, 20, 24 – 28, 34, 35 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Dahung (EP 0643209) in view of Bundrick (U.S. Pat. No. 4,419,969) and further in view of Gonzalez (U.S. Pat. No. 4,765,293). This rejection is respectfully traversed.

Claims 1 and 13 include initiating fuel injection and concurrently initiating injection of an acetylene-based component into the engine, mixing air, the fuel and the acetylene-based component to form a combustion mixture and compressing the combustion mixture to induce auto-ignition of the combustion mixture. Dahung fails to teach or suggest concurrently initiating injection of a fuel and an acetylene-based component, mixing air, the fuel and the acetylene-based component to form a combustion mixture and compressing the combustion mixture to induce auto-ignition of the combustion mixture.

As discussed in detail in the Amendment filed on August 9, 2004 and as indicated by the Examiner on Page 2 of the Final Office Action issued on September 10, 2004, Dahung fails to teach or suggest concurrently injecting a fuel and an acetylene-based component. Dahung specifically teaches that the main fuel is introduced into the combustion chamber prior to the pilot fuel under high load conditions. Under low load conditions, the pilot fuel is introduced into the combustion chamber prior to introducing

the main fuel into the combustion chamber (see Abstract and Col. 2, Line 47 through Col. 3, Line 15). Bundrick fails to cure the deficient teachings of Dahung.

Gonzalez also fails to cure the deficient teachings of Dahung. More specifically, Gonzalez discloses a hybrid internal combustion engine including a pre-combustion chamber or prechamber 19 having a pilot fuel injector 22 and a spark plug 24. The prechamber 19 connects with a cylinder 15 through a passage 20. The cylinder 15 slidably supports a piston 11 that includes a main combustion chamber recess or bowl 16 formed in a top surface thereof. (see Col. 4, Lines 21 – 50 and Figures 1 – 3). In operation, the piston 11 compresses air to induce a swirling airflow pattern in the prechamber 19 (Col. 5, Lines 28 – 32). The pilot fuel injector 22 injects a pilot fuel into the prechamber 19 (Col. 5, Lines 33 – 35). The spark plug 24 ignites the pilot fuel within the prechamber 19 inducing a flow of hot exhaust from the prechamber 19 through the passage 22 and into the cylinder 15 and specifically into the main combustion chamber 16 (Col. 5, Lines 41 – 43 and Lines 51 – 54). A main fuel spray 29 is injected into the main combustion chamber 16 and is ignited therein as a result of the heat provided by the exhaust from the prechamber 19.

Gonzalez fails to cure the deficient teachings of Dahung on several points. Initially, Gonzalez is directed toward spark-ignition engines that include a spark plug to induce combustion. The system of Gonzalez is not applicable to compression ignition engines. Further, Gonzalez requires the pilot fuel to be ignited separately from the main fuel. As described in detail above and throughout the text of Gonzalez, the pilot fuel of Gonzalez is combusted within the prechamber 19 prior to combustion of the main fuel. Therefore, Gonzalez separately combusts the fuels and does not create a combustion mixture.

Applicant further notes that one skilled in the art would not look to Gonzalez to supplement the deficient teachings of Dahung. There is no suggestion or motivation to combine the references because Gonzalez teaches away from Dahung. More specifically, Gonzalez requires the pilot fuel and main fuel to be separately injected into different combustion chambers and separately combusted. Dahung teaches that the pilot fuel and the main fuel are mixed and are combusted together.

In view of the foregoing, reconsideration and withdrawal of the rejections are respectfully requested.

Claims 2 and 8 – 12 ultimately depend from claim 1, which defines over the prior art as discussed in detail above. Therefore, claims 2 and 8 – 12 also define over the prior art for at least the reasons stated above with respect to claim 1, and reconsideration and withdrawal of the rejections are respectfully requested.

Claims 14, 17, 20 and 24 – 26 ultimately depend from claim 13, which defines over the prior art as discussed in detail above. Therefore, claims 14, 17, 20 and 24 – 26 also define over the prior art for at least the reasons stated above with respect to claim 13, and reconsideration and withdrawal of the rejections are respectfully requested.

Claim 27 includes a fuel supply that initiates injection of a hydrocarbon fuel in a first amount, an acetylene supply that concurrently initiates injection of an acetylene-based component in a second amount and a cylinder having a piston reciprocally driven therein, the cylinder receiving a combustion mixture including a third amount of air, the first amount of hydrocarbon fuel and the second amount of the acetylene-based component. Dahung fails to teach or suggest a fuel supply that initiates injection of a hydrocarbon fuel in a first amount, an acetylene supply that concurrently initiates injection of an acetylene-based component in a second amount and a cylinder having a

piston reciprocally driven therein, the cylinder receiving a combustion mixture including a third amount of air, the first amount of hydrocarbon fuel and the second amount of the acetylene-based component.

Bundrick fails to cure the deficient teachings of Dahung. Gonzalez further fails to cure the deficient teachings of Dahung, as discussed in detail above with respect to claims 1 and 13. Therefore, claim 27 defines over the prior art and reconsideration and withdrawal of the rejection are respectfully requested.

Claims 28, 34 and 35 ultimately depend from claim 27, which defines over the prior art as discussed in detail above. Therefore, claims 28, 34 and 35 also define over the prior art for at least the reasons stated with respect to claim 27, and reconsideration and withdrawal of the rejections are respectfully requested.

Claims 3, 15 and 29 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Dahung (EP 0643209) in view of Bundrick (U.S. Pat. No. 4,419,969) and further in view of Gonzalez (U.S. Pat. No. 4,765,293) and Britton (U.S. Pat. No. 6,314,925). This rejection is respectfully traversed.

Claims 3, 15 and 19 ultimately depend from one of claims 1 and 13, which define over the prior art as discussed in detail above. Therefore, claims 3, 15 and 19 also define over the prior art for at least the reasons stated above with respect to claims 1 and 13, and reconsideration and withdrawal of the rejections are respectfully requested.

Claims 4, 16 and 30 – 32 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Dahung (EP 0643209) in view of Bundrick (U.S. Pat. No. 4,419,969) and further in view of Gonzalez (U.S. Pat. No. 4,765,293) and Dickey (U.S. Pat. No. 5,832,880). This rejection is respectfully traversed.

Claims 4, 16 and 30 – 32 ultimately depend from one of claims 1, 13 and 27, which define over the prior art as discussed in detail above. Therefore, claims 4, 16 and 30 – 32 also define over the prior art for at least the reasons stated above with respect to claims 1, 13 and 27, and reconsideration and withdrawal of the rejections are respectfully requested.

Claims 5, 6, 21, 22 and 33 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Dahung (EP 0643209) in view of Bundrick (U.S. Pat. No. 4,419,969) and further in view of Gonzalez (U.S. Pat. No. 4,765,293) and Bromberg et al. (U.S. Pat. No. 5,409,784). This rejection is respectfully traversed.

Claims 5, 6, 21, 22 and 33 ultimately depend from one of claims 1, 13 and 27, which define over the prior art as discussed in detail above. Therefore, claims 5, 6, 21, 22 and 33 also define over the prior art for at least the reasons stated above with respect to claims 1, 13 and 27, and reconsideration and withdrawal of the rejections are respectfully requested.

Claims 7 and 23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Dahung (EP 0643209) in view of Bundrick (U.S. Pat. No. 4,419,969) and further in view of Gonzalez (U.S. Pat. No. 4,765,293) and Ethington et al. (U.S. Pat. No. 4,690,743). This rejection is respectfully traversed.

Claims 7 and 23 ultimately depend from one of claims 1 and 13, which define over the prior art as discussed in detail above. Therefore, claims 7 and 23 also define over the prior art for at least the reasons stated above with respect to claims 1 and 13, and reconsideration and withdrawal of the rejections are respectfully requested.

Claims 7 and 23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Dahung (EP 0643209) in view of Bundrick (U.S. Pat. No. 4,419,969) and further in

view of Gonzalez (U.S. Pat. No. 4,765,293) and Lowther et al. (U.S. Pat. No. 4,965,052). This rejection is respectfully traversed.

Claims 7 and 23 ultimately depend from one of claims 1 and 13, which define over the prior art as discussed in detail above. Therefore, claims 7 and 23 also define over the prior art for at least the reasons stated above with respect to claims 1 and 13, and reconsideration and withdrawal of the rejections are respectfully requested.

ALLOWABLE SUBJECT MATTER

The Examiner states that Claims 18, 19, 36 would be allowable if rewritten in independent form. Applicants have refrained from rewriting Claims 18, 19, and 36 in independent form in view of the discussion above.

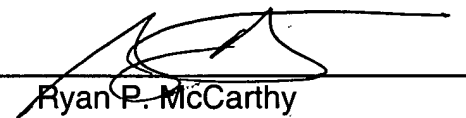
CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (313) 665-4969.

Respectfully submitted,

Dated: December 10, 2004

By: _____


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